SOME NOTES ON TOWER ERECTION

By

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First of all, let me clarify a couple of points made in the first article of this series (Some Notes on Antenna Erection, NCJ Vol. 5, #5). The knot we use most often is more correctly called a "clove hitch" rather than two half hitches. While you're into your Boy Scout Manual checking that out, you might also learn the bowline; it, too, is a very useful knot. The second point is the fastening of the safety belt. The clasp should open toward your body to prevent accidental opening. Now on to towers:

Selection of a tower has so many variables that listing all the possible configurations and heights and antennae which you might use would fill this entire magazine. Generally, there are some constants which determine what most contesters wind up with for an antenna support. Such things as ordinances, lot size, budget, aesthetics, and the XYL figure greatly into what limits tower size and type. The two most popular ways to go are crankups and stacked tower (Rohn 25-type).

A crankup tower is nice for those who like the flexibility of being able to reach the antenna from roof level, those who don't like to climb, those who have a need to keep the antenna inconspicuous when it is not in use, or those who have erratic wind conditions. There are many drawbacks to crankup towers. Most of all, they are dangerous. When shipped from the factory to you, any mishandling can cause binds that put enormous stress on the cable while cranking up and cause the tower to come down erratically. This leads to the ever-present danger of losing a finger or a toe (they are not forgiving of any error in use). The other consideration is they are extremely expensive, especially the so-called free standing types. Crankups require a massive base to hold them in place.

If you do decide on a crankup (or foldover), inspect it carefully when you get it. Follow the manufacturer's specifications in installing the base and the tower. Do not take shortcuts. Buy the safety stops and release most of the tension from the cable when it is in place. Don't rely on the winch mechanism to keep the tower extended. Safety wire the winch in place (especially when there are children around). Finally, don't sell yourself on the idea that you'll run out every night when the wind blows to crank it down. Unless you have a motorized winch, you will find that the cranking up and down process is a back-breaking job and those unexpected winds come up only while you are at the office. (Once the wind starts, the side loading is so great that you probably won't be able to get it down safely anyway.)

The other most common tower is the triangular steel tower, generally 10' sections, 12" to 18" on a side (Rohn 25 and 45 types). This type of tower is the most sturdy, but its drawbacks are that it is fairly permanent and has to be climbed. It will, however, hold up most anything that a contester would care to stack on it if installed properly. Manufacturers provide engineering data on their towers. This data is very conservative because the manufacturers are liable for the data they provide. While I don't advise deviating from manufacturing specifications, the tower can stand a lot of abuse without

serious danger. These towers must be guyed, in most cases, and this can cause problems on a city lot. Unless you know a civil engineer, take some graph paper and a 100' tape measure and draw your house and lot to scale (be sure to include obstructions).

Next, you need to decide how high to make the tower. 40' to 60' is good for quads and for stateside contests. 60' to 80' is good for tribanders, monobanders and short 40's. Try to decide on tower height by multiples of half wavelengths. 70' is an ideal height on 40 and 20, the key bands, and it is also high enough on 10 and 15 to be extremely potent. You would have to go to 140' on 40 to notice a significant difference, and 100' on 40 gives you a useless major lobe straight up. Use the Rohn or Triex engineering data to determine for how much windload you want to guy. For most installations, i.e., a TH6 on 60' of Rohn 25, 3 sets of guys spaced 45' from the tower base will be satisfactory.

Now make a paper model of the tower and the three guy wires to scale. By placing it on the scale drawing of your house, you can determine the ideal location for your tower. Don't overlook using the house as a support point for the tower, but don't plan to anchor guy wires to the house or phone poles. Some thought must be given to guy anchors. In some parts of the country, tower location is determined by where you can find holes in the rock to put anchors. In very sandy soil, you need 2 or 3 yards of concrete to anchor a 50' tower. Guy anchors are largely a matter of practicality and preference. Screw anchors (6" blade, 6' shaft) work well for towers up to 70' in tight soil. Hardware stores sell these anchors as mobile home tie-downs at about half the price tower companies charge. A "deadman" made of a heavy hooked rod in a 5' deep hole filled with concrete will hold most anything. If you have to get the guys off the ground, check your local junk yards for a 10' length of 4" or 6" drill stem or other heavy steel pipe. Bury half of it in a hole filled with a couple of yards of concrete. This type of guy anchor is especially useful on small lots, where it allows you a safe shorter guying distance (use your trig tables or draw a model of the tower and guy anchors to determine how much you can save in distance by having the anchor 5' in the air), but don't make it so high that you can't reach the guy wires to tighten them.

Now that you have the guy anchors located and installed and your back has recovered, it's time to put in the tower base. There are various base plates, anchors, and base sections available. If you use a base plate, follow the manufacturer's recommendations for installation. The cheapest and easiest way to go is to use a regular 10' tower section. Dig a 4' deep, 2' to 3' diameter hole. After the hole is dug, put about 4" of sand in the bottom and drive a 4' ground rod down. Set the 10' section in the hole and attach the ground rod with hose clamps and heavy braid. Using scrap pieces of steel rod, drive reinforcing rods into the earth around the tower section at several points inside the hole. Then lash the rod to the tower with scrap wire. Pour the hole full of concrete, a foot at a time, making sure all 3 legs are plumb and level as you pour. Once you've poured about 2 feet, you won't be able to move the tower. Now take a week off and let the concrete dry.

Guy wire is what really holds a tower up, so don't cut corners. Good quality 3/16" or ¼" stainless or galvanized guy cable or wire rope is most commonly used. There is also a nonmetallic guy cable

available called Phillystran (manufactured by the Philadelphia Resins Company). It is extremely durable but slightly more expensive than guy wire and is difficult to terminate. If you use guy wire, you might want to break up the top set of guys into nonresonant lengths. If you are so inclined, use heavy duty "johnnyball" insulators (where the wires loop over each other). If you have a friend in the local light company, you may be able to get Nicopress crimp-on terminations to clamp the ends of the guy wire. If not, use 2 or 3 cable clamps for each termination. Get the correct size for the cable used and be sure the bolts face towards the live wire, not the dead end. Remember, "never saddle a dead horse."

Whip out the old trig tables again (or use the Rohn or Triex data) to determine guy wire lengths for each level. Precut the guys but leave a little extra in case your equations aren't perfect and for a handle to pull on when tightening them.

The last consideration before starting is the turnbuckles. The eye and jaw type is easiest for fastening to the guy anchor. They should be the 12" variety with 3/8" bolts, galvanized steel. Open the turnbuckles to about an inch from the ends and attach them to the guy anchors. Lay out the tower sections and clean out the holes and deburr the mating sections of the tower. Slip the sections together on the ground to make sure they will align. Mate the bolts and nuts and tape them to each leg where they will be easy to reach. This is also a good time to install the rotor plate, rotor and mast. Hook up the rotor and be sure it is aligned and that the mast turns freely. Leave the rotor set at one of its stops and note where you left it. Roll up the rotor cable and tape it to the tower section.

Assuming you have a gin pole and read the last article in this series, you're about ready to go. Attach the gin pole just below the top of the first section and extend the gin pole to its full height. Stand up the next section (but don't get dirt inside the legs) and tie the fall line just above the center of gravity. Pull the section up and lower it into place. Keep the leg with the rope on it next to the gin pole. Bolt the sections together and lower the gin pole. Tie the rope to the gin pole and unfasten it from the tower. Climb to the top of the new section, pull the gin pole up with the rope, fasten it to the tower and you're ready to do it again. When you get to a guy level, unroll the guys on the ground and attach them to the section before it is raised so you won't have to climb the unguyed section. Get off the tower during the guying procedure. Loosely attach the three guys to the turnbuckles. In rotation, pull the guys tight, by hand, and tighten the cable clamps. Using a keen eye and a level, tighten the turnbuckles about an inch at a time, in rotation, until the guys are tight. Since "tight" is a subjective state, you can either use Rohn's figures and a series dynamometer to tension the guys or, as one of my learned friends says, they should be tight enough to walk up. When the entire tower is in place and guyed, you can go up with a level and check out your eyeballs. Also, sight the tower for any "dog legs" and adjust the guys accordingly. Cut off the excess guy wire and tighten the cable clamps. You might want to safety wire the turnbuckles to prevent tampering.

There it is, three pages of getting ready and a few sentences on putting the thing up. You hardly worked up a sweat???

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